

What is claimed is:

1. A method for controlling a motor, comprising:
5 applying a first motor adjustment signal within a first dynamic range of
motor adjustment signals to control a flow of current through the
motor, the first motor adjustment signal determined in relation to a
detected motor velocity error;

10 when the first motor adjustment signal is proximate a selected one of an
upper end or a lower end of the first dynamic range, adjusting the
first dynamic range to provide a different, second dynamic range of
motor adjustment signals; and

subsequently applying a second motor adjustment signal within the second
dynamic range to control application of current to the motor.

15 2. The method of claim 1, wherein the adjusting step comprises
expanding the first dynamic range so that the second dynamic range is larger than
the first dynamic range when the first motor adjustment signal is proximate the
upper end of the first dynamic range.

20 3. The method of claim 2, wherein the first dynamic range has a
minimum level and a maximum level and wherein the first motor adjustment
signal is determined during the adjusting step to be proximate the upper end of the
first dynamic range when a magnitude of the first motor adjustment signal is
between the maximum level and a threshold level between the minimum level and
25 the maximum level.

25 4. The method of claim 3, wherein the maximum level is characterized
as value D_{MAX} and the threshold level is characterized as a value $(1-[1/N])D_{MAX}$,
where N is a constant.

30 5. The method of claim 1, wherein the adjusting step comprises
contracting the first dynamic range so that the second dynamic range is smaller

than the first dynamic range when the first motor adjustment signal is proximate to the lower end of the first dynamic range.

6. The method of claim 5, wherein the first dynamic range has a minimum level and a maximum level and wherein the first motor adjustment signal is determined during the adjusting step to be proximate the lower end of the first dynamic range when a magnitude of the first motor adjustment signal is between the minimum level and a threshold level between the minimum level and the maximum level.

7. The method of claim 6, wherein the maximum level is characterized as a value D_{MAX} , the minimum level is characterized as a value D_{MIN} and the threshold level is characterized as a value $(1/N)D_{MAX}$, where N is a constant.

8. The method of claim 1, wherein the first and second dynamic ranges respectively comprise ranges of a digital to analog converter (DAC), wherein the DAC outputs voltages in response to the first and second motor adjustment signals that are compared to a voltage at a node of the spindle motor to control a flow of current through the spindle motor.

9. The method of claim 1, wherein the first and second motor adjustment signals respectively comprise multibit digital values.

10. The method of claim 1, wherein the motor comprises a spindle motor which rotates a magnetic recording disc in a disc drive data storage device.

11. The method of claim 1, wherein the motor uses at least one hydrodynamic bearing to facilitate rotation of the motor, and wherein the applying and adjusting steps are carried out while the motor is rotated at a nominally constant velocity.

12. A motor driver circuit for controlling a motor, comprising:
a digital to analog (DAC) assembly which converts input digital signals to
corresponding analog signals over a range of different selectable
dynamic ranges;

5 control logic which generates a first motor adjustment signal within a first
dynamic range of the DAC assembly, the first motor adjustment
signal generated in relation to a velocity error of the motor, wherein
the DAC assembly outputs an analog voltage in response to the first
motor adjustment signal to control flow of current through the
motor;

10 selection circuitry which adjusts the DAC assembly to a second dynamic
range when the first motor adjustment signal is proximate a selected
one of an upper end or a lower end of the first dynamic range so
that a subsequent second motor adjustment signal generated by the
control logic is provided within the second dynamic range.

15 13. The motor driver circuit of claim 12, wherein the second dynamic
range is larger than the first dynamic range when the first motor adjustment signal
is proximate the upper end of the first dynamic range.

20 14. The motor driver circuit of claim 12, wherein the second dynamic
range is smaller than the first dynamic range when the first motor adjustment
signal is proximate the lower end of the first dynamic range.

25 15. The motor driver circuit of claim 12, wherein the selection circuit
determines the first motor adjustment signal to be proximate the upper end of the
first dynamic range when a magnitude of the first motor adjustment signal is
between a maximum level of the first dynamic range and a threshold level between
the maximum level and a minimum level of the first dynamic range.

30 16. The motor driver circuit of claim 12, wherein the selection circuit
determines the first motor adjustment signal to be proximate the lower end of the
first dynamic range when a magnitude of the first motor adjustment signal is

between a minimum level of the first dynamic range and a threshold level between the minimum level and a maximum level of the first dynamic range.

17. The motor driver circuit of claim 12, further comprising a filter which filters the first and second motor adjustment signals.

18. A disc drive, comprising:
a spindle motor configured to rotate a magnetic recording disc on which
user data are stored by a data transducing head; and
a motor control circuit coupled to the spindle motor, comprising:
5 a digital to analog (DAC) assembly which converts input digital
values to corresponding analog voltages over a range of
different selectable dynamic ranges;
control logic which generates a first motor adjustment signal within
a first dynamic range of the DAC assembly, the first motor
adjustment signal generated in relation to a velocity error of
10 the spindle motor, wherein the DAC assembly outputs an
analog voltage in response to the first motor adjustment
signal to control flow of current through the spindle motor;
and
15 first means for adjusting the DAC assembly to a second dynamic
range when the first motor adjustment signal is proximate a
selected one of an upper end or a lower end of the first
dynamic range so that a subsequent second motor
adjustment signal generated by the control logic is provided
20 within the second dynamic range.

19. The disc drive of claim 18, wherein the first means comprises a
selection circuit coupled to the control logic, wherein the selection circuit
determines the first motor adjustment signal to be proximate the upper end of the
25 first dynamic range when a magnitude of the first motor adjustment signal is
between a maximum level of the first dynamic range and a threshold level between
the maximum level and a minimum level of the first dynamic range, and wherein
the selection circuit determines the first motor adjustment signal to be proximate
the lower end of the first dynamic range when a magnitude of the first motor
30 adjustment signal is between the minimum level and a threshold level between the
minimum level and the maximum level

20. The disc drive of claim 19, wherein the selection circuit comprises a programmed servo processor device.